

Knittel, Janette

From: King, Aaron S CIV USARMY CENWK (USA) <Aaron.S.King@usace.army.mil>
Sent: Wednesday, May 27, 2020 6:47 AM
To: Knittel, Janette
Cc: Thomas, Lee
Subject: RE: Draft Rhone Poulenc Carbon Dioxide Neutralization Pilot Study Comments
Attachments: USACE Comments on CO2 Neutralization Pilot Study Report.docx

Hi Janette,

Good morning. I have reviewed the report and my comments are attached. Please let me know if you have any questions.

Thank you,

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Environmental Engineer
US Army Corps of Engineers, Kansas City District
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From: Thomas, Lee <Thomas.Lee@epa.gov>
Sent: Tuesday, May 26, 2020 11:39 AM
To: Knittel, Janette <Knittel.Janette@epa.gov>; King, Aaron S CIV USARMY CENWK (USA) <Aaron.S.King@usace.army.mil>
Subject: [Non-DoD Source] Draft Rhone Poulenc Carbon Dioxide Neutralization Pilot Study Comments

Janette,

As requested, I have reviewed the Rhone Poulenc Carbon Dioxide Neutralization Pilot Study and have comments which are attached in a Word document.

Please let me know if you have any questions.



Carbon Dioxide Neutralization Pilot Study Results

Former Rhone-Poulenc Site

Tukwila, Washington

Document Date: May 15, 2020

USACE Comments from Aaron King

Section 2.0, paragraph following the numbered list. The first sentence of the paragraph is objective 8 and should be included in the numbered list rather than in the paragraph.

Section 3.2.4 and Figure 5. The full 15-ft length of the vent well screen isn't reflected on Figure 5.

Section 3.5, page 14 and Table 6. The text states "IMW-A2-S, IMW-B2S, and IMW-A2-D were erroneously sampled for sulfide during baseline groundwater sampling." Consider adding a note to Table 6 indicating that these wells were sampled for sulfide.

Section 3.5.2, top of page 17. The text states "The pH and temperature in IMW-B1-S fluctuated around 7.7 SU... however the water level did not change." What value did the temperature fluctuate around?

Section 3.5.2, top of page 17. The text states "The changes in groundwater pH observed in IMW-A2-S and IMW-B1-S appeared to fluctuate tidally, however water level remained constant." Can you be more specific about the relationship between tide and pH? For example, did pH increase at high tide?

Section 3.5.2, top of page 17. The text states "The changes in groundwater pH observed in IMW-A2-S and IMW-B1-S appeared to fluctuate tidally, however water level remained constant." The observation that the pH changed with tide but water level didn't is unexpected. Could the constant water level be related to effects of the groundwater extraction system?

Section 4.1.1, top of page 19. Text states "Figure 11 shows that inflection points occurred during the titration at a pH of approximately 6.5 SU and 4.5 SU." I think these inflection points are shown on Figure 10.

Section 4.2.1, first paragraph. Final sentence refers to an optimal operating point for CO₂. What is meant by operating point? Flow and pressure? Please clarify.

Section 4.3.2, bulleted list, Injection events 3-5. The text for Injection event 3 suggests that the practical ROI was greater in the direction orthogonal to the barrier wall. Was this also observed for Injection events 4 and 5? This could be useful information for full-scale injection well placement and spacing near the barrier wall.

Figure 28. The scale on the y-axis needs to be revised; it shows several 2s and 3s. I suspect you just need to add a digit to the right of the decimal point.

Section 4.4.1.2, last sentence. Text states "The water level in the UAZ generally rebounded to pre-injection levels faster than water levels in the UAZ...". Should this be water levels in UAZ generally rebounded faster than water levels in the LAZ?

Section 4.4, general comment. Significant changes in water level were observed in the LAZ, especially at higher injection pressures, but these changes are not really reflected in the water level observations in the UAZ. Could you explain why that might be?

Sections 4.4.1.1 and 4.4.2.1. Phases 1 and 3 show opposite trends in groundwater mounding with respect to the barrier wall. Looking ahead a bit, how would this information be used to place and space injection wells near the barrier wall?

Figure 32. Is there a reason that Injection 1 isn't shown on this figure? It has been on others.

Section 4.5.1. Text states "Note that several increases in pH and temperature that occurred during or immediately after monitoring events shown on the figures appear to be correlated with purging each well prior to sample collection. These changes are most pronounced in the wells screened in the LAZ, and in MW-54 likely due to the low hydraulic conductivity associated with the silty sand layer. The purging of the well prior to sampling likely caused water from the LAZ to be mixed into the well screen interval. This suggests that groundwater in the well screen may vary from aquifer conditions adjacent to the well." Did water levels decrease in the wells during sampling? For wells that saw changes in pH and temperature during and immediately following sampling, how representative of the aquifer do we think the wells are? Does it affect our confidence in the continuous pH and temperature observations from the sensors deployed in these wells?

Section 4.6.2, second paragraph. Text states "The total amount of CO₂ injected is presented in Tables 7 and 8." I think this should just be Table 7.

Section 4.6.3, general question/comment. I think LCP chemical saw 10% utilization efficiency in their proof of concept test, and something closer to 30% in their Phase 1 full-scale test. So, it seems possible, at least, that a full-scale system at Rhone Poulenc could have a higher utilization efficiency than was observed during the pilot study.

Section 4.8, general comment. Recommend adding a brief discussion of the mechanisms for COC concentration reductions resulting from the CO₂ injection.